Assignment 13.1 Questions 17, 18, 20, 22, 26, 28, 30, 32, 65

17) a. $K = \dfrac{[NO]^2}{[N_2]\,[O_2]}$ b. $K = \dfrac{[NO_2]^2}{[N_2O_4]}$

c. $K = \dfrac{[SiCl_4]\,[H_2]^2}{[SiH_4]\,[Cl_2]^2}$ d. $K = \dfrac{[PCl_3]^2\,[Br_2]^3}{[PBr_3]^2\,[Cl_2]^3}$

18) a. $K_p = \dfrac{P_{NO}^2}{P_{N_2} \times P_{O_2}}$ b. $K_p = \dfrac{P_{NO_2}^2}{P_{N_2O_4}}$

c. $K_p = \dfrac{P_{SiCl_4} \times P_{H_2}^2}{P_{SiH_4} \times P_{Cl_2}^2}$ d. $K_p = \dfrac{P_{PCl_3}^2 \times P_{Br_2}^3}{P_{PBr_3}^2 \times P_{Cl_2}^3}$

20) a. $K_p' = 5.3 \times 10^{-3}$ (K_p is inversed because equilibrium is reversed and square root because concentrations are halved.)

b. $K_p'' = 2.9 \times 10^{-5}$ (K_p is inversed because equilibrium is reversed)

c. $K_p''' = 190$ (Took square root because concentrations are halved)

22) $K = \dfrac{[NCl_3]^2}{[N_2]\,[Cl_2]^3} = \dfrac{[0.19]^2}{[0.0014]\,[0.00043]^3} = 3.2 \times 10^{11}$

26) $K_p = \dfrac{P_{NH_3}^2}{P_{N_2} \times P_{H_2}^3} = \dfrac{(0.031)^2}{(0.85)\,(0.0031)^3} = 38{,}000$

$\dfrac{(0.0167)^2}{(0.525)\,(0.00761)^3} = 1{,}200$

Since these concentrations do not produce the same constant, they cannot be in equilibrium.

28) $K_p = K\,(RT)^{\Delta n}$

($\Delta n = -1$ because there is one less mole of gas in the products)

$0.25 = K\,(0.08206 \times 1100)^{-1}$ $K = 23$

30) K_p is only equal to K if both sides of the equation have equal moles of gas. This is true only in reaction (d).

32) $K_p = \dfrac{P_{H_2}}{P_{H_2O}^4} = \dfrac{(21.3)^4}{(15.0)^4} = 4.07$

65) $K_1 \times K_2 = 39.44 \times 10^{-83}$ Since the sum of these two reactions is the reverse of the desired reaction, K is inversed. **$K = 2.5 \times 10^{81}$**